Background

Traditional learning methodologies based on passive transmission of information, fail to develop a set of competences that students require for their professional life and their relation with the surrounding Society. Therefore, Higher Education Institutions (HEIs) are required to modernize their pedagogical methodologies, moving into active learning processes whereby students engage in activities that promote higher order learning skills like analysis, synthesis, and evaluation.

Project and Problem-based learning (PBL) are active and learner-centred methodologies in which students develop their knowledge and competences by following a problem solving process, usually based on real-life situations. The identified benefits for engineering and technology students are considerable improvements in critical, lateral and creative thinking, problem solving strategies, intrinsic motivation, group collaboration, communication skills, entrepreneurship and integration with the society.

Supporting active learning through ICT tools (virtual social communities, games and VR/AR simulations) creates Virtual Learning Environments (VLE) where the new technologically-savvy generation of students feels comfortable.

Project Objectives

The objective of the ALIEN (Active Learning In ENgineering education) project is thus to design, implement and validate an active learning methodology based on PBL (Project/Problem) environments addressing real-life issues related to science, technology, engineering and math (STEM) concepts. The methodology will be supported by a VLE including a set of digital tools that will allow students to experiment, collaborate and communicate in an extended and multinational learning community that will also include other stakeholders like teachers and researchers.

Outcomes

The strategic plan to be adopted/adapted by each institution on the use of Active Learning and Problem/Project Based Learning has mostly impact on the institutional and pedagogical level;

The PBL laboratory is part of the institutional strategy and impacts directly on teachers and students but depends heavily on the technological level;

The validated pedagogical methodology (flexible enough to allow for several instances) that promotes AL and PBL impacts mainly at pedagogical level but depends on the technological tools. Its systematization depends on the institutional level;

The online collaborative and project management platform acts mostly on the pedagogical level by supportings the production, storage, share and reuse of problems and challenges to be used in PBL. Also because it will also organize the process of setting up a PBL process by guiding the teachers through all the stages of the methodology;

A set of 45 serious games and simulations and corresponding pedagogical guidelines, available on the platform that demonstrate, how to use PBL. To the possible extent, these problems will be configurable and customizable, for instance to reflect real situations. Examples of these games and simulations exist today for physics simulation, industrial management and different engineering application. Some of these simulation contexts will be developed for Virtual Reality (VR) environments to allow more immersive presence in the context;

A set of training actions motivating and preparing teachers for the implementation of PBL. On the first meeting specific training will be provided to partners on the use of AL and PBL (therefore 3 persons are expected to attend the initial meeting per partner). Partner participants will then proceed to train their own teachers. To reinforce the process, on each of the following meetings workshops will be organized to train local teachers. Public sessions will also be organized to show other stakeholders (students, researchers, deciders) the advantages of using AL and PBL.

Partner Organisation

Greece

    University of Thessaly

Cambodia

    University of Battambang

    Meanchey University

Institute of Technology Cambodia

Estonia

Tallinn University

Nepal

Kathmandu University

Tribhuvan University

Bulgaria

Technical University of Gabrovo

Pakistan

National University of Computer and Emerging Sciences

ISRA University

United Kingdom

University of Central Lancashire

Vietnam

Von Neumann Institute

Hanoi University

Hanoi University of Science and Technology

Malaysia

University of Malaya

University Tenaga National

Portugal

Porto Polytechnic